

Action Plan - AAWG Proposed Tasking:
Damage Tolerance Analysis
of Major Repairs, Alterations and Modifications (RAMS)
To Comply With Aging Airplane Safety Rule (AASR)

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FAA Public Meeting
Aging Aircraft Safety Rule (AASR)
February 27, 2003 - Seattle

Background - New 14 CFR Section 121.370a , 129.16 and 135.168 Supplemental Inspections

“After December 5, 2007, a certificate holder may not operate an airplane under this part unless the maintenance program for that airplane includes damage tolerance-based inspections and procedures.”

From the AASR Preamble, the damage tolerance requirement also applies to the following service actions through the inclusion of broad “maintenance program” language:

- Major repairs on all primary structure
- Supplemental Type Certifications (Major Alterations)
- Other modifications

Extends Damage Tolerance Assessments of Repairs, Alterations and Modifications Beyond Fuselage Pressure Boundary

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Background - Public Meeting

Public Meeting announcement (Federal Register, Volume 68, No. 10, Wednesday, January 15, 2003 Notices) solicits the following comments:

“Opinions from the public/industry regarding alternative approaches (other than Ads) for defining specific methods of compliance to address RAMs as required by the AASR for various models of transport category airplanes..”

and, furthermore, states:

“The AASR requires the maintenance programs of those airplanes to include damage tolerance-based inspections and procedures that include all major structural repairs, alterations, and modifications (RAMs).”

How Does Industry Prepare For This (Compliant Programs)?

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AAWG Comments

ARAC Airworthiness Assurance Working Group (AAWG) suggests that additional information is needed to provide industry with acceptable guidelines to comply with the damage tolerance analysis requirements of AASR. AAWG Members have expressed the following concerns:

- AASR extends DTA requirements beyond fuselage pressure boundary for FAR 25.571 pre-Amendment 45 airplanes without consideration of industry capability
- Extensive advisory material, including OEM Repair Assessment Guideline Documents, were necessary to provide acceptable compliance procedures with prior regulatory actions requiring post-certification DTA
- AASR leads to broad interpretations of damage tolerance-based maintenance programs through vague references to what structure is affected and compliance procedures
- Standardized and harmonized (USA and Europe) approaches are needed
- Effective Widespread Fatigue Damage (WFD) Prevention programs will also require repair assessments

As Implemented, Safety Objectives May Not Be Achieved

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AAWG Repair Assessment Development Experience

AAWG, chartered under the Federal Advisory Committee Act in 1989 to provide technical expertise and forum for aging airplane rulemaking, has in-depth repair assessment program development experience:

- Repair Assessment Sub-Task Group chartered by AAWG in December 1991
- Repair survey of 30 retired airplanes was conducted in March, 1992
 - 85% of repairs found on fuselage pressure boundary
- Repair Rule Writing Task Group formed by AAWG in June, 1994
 - Second survey (consisting of inservice airplanes) conducted by OEM and operator Teams confirming earlier survey results (majority of repairs performed on fuselage pressure boundary)
- AAWG approved final report in December 1996 two years later
 - Effort required 12 meetings to standardize fuselage pressure boundary repair assessment process
- Two additional years required by OEMs to finalize Repair Assessment Guideline Documents (RAG Documents given to operators in 1998-2000)
- Repair Assessment Rule became effective May 25, 2000 giving operators and additional 12 months to incorporate programs into their maintenance programs

Structured and Successful Approach, With Compliant Programs Implemented

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Technical Issues

To comply with the AASR rule damage tolerance requirements extending beyond the fuselage pressure boundary on FAR 25.571, pre-amendment 45 airplanes and to some extent post-Amendment 45 airplanes (pre-Amendment 54) the following technical issues must be evaluated and procedures developed:

- Are standardized approaches possible (for wing, pylons, stabilizers...)?
- Applicability of generic spectrums (TWIST for example)
- Importance of spectrum effects (stress history and calibration) on crack growth
- Complexity of aeroelastic considerations in assessing repair stiffness effects
- Establish criteria for determination of RAM material compatibility with TC structure
- Understanding repair durability and residual strength effects for wide range of repairs
- Inspection reliability and processes
- Determination of RAM size limits and areas for which no assessment is necessary for each affected model specific airplane
- Determination of implementation thresholds and repeat intervals
- Correlation with widespread fatigue damage prevention approaches

Substantive Technical Issues Remain To Be Addressed

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AAWG Recommendations

- Withdraw 14 CFR 121.370a Supplemental Inspections as written in AASR
- Leverage the experience of AAWG in developing successful Aging Airplane Programs
 - Modifications and inspections (1991)
 - Corrosion Prevention and Control Programs (1990-91)
 - Aging Airplane Maintenance Program Guidelines (1991)
 - Supplemental Structural Inspection Program Reassessments (1993-1994)
 - Reassessment of Service Bulletins for Modification Program Inclusion (1996)
 - Repair Assessment of Fuselage Pressure Boundary (1998)
 - Widespread Fatigue Damage Prevention (1996 - 2003)
- Task AAWG to develop new RAM DTA program
 - Timelines based on industry capabilities
 - Consensus and effective programs
 - Standardized approaches
 - Guidance and training materials
 - Operators, OEMs, and regulatory authorities engaged
 - Achievable economics
 - Safety objectives met
- Harmonize regulatory requirements (USA and Europe)